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# SUMMARIES OF ARTICLES.

[ABBREVIATIONS.—*Am. J. Ps.* = *The American Journal of Psychology; Ar. de Ps.* = *Archives de Psychologie; Ar. f. G. Ph.* = *Archiv für Geschichte der Philosophie; Ar. f. sys. Ph.* = *Archiv für systematische Philosophie; Br. J. Ps.* = *The British Journal of Psychology; Int. J. E.* = *International Journal of Ethics; J. of Ph., Psy., and Sci. Meth.* = *The Journal of Philosophy, Psychology, and Scientific Methods; J. de Psych.* = *Journal de Psychologie; Psych. Bul.* = *Psychological Bulletin; Psych. Rev.* = *Psychological Review; Rev. de Mét.* = *Revue de Métaphysique et de Morale; Rev. Néo-Sc.* = *Revue Néo-Scolastique; Rev. Ph.* = *Revue Philosophique; Rev. de Ph.* = *Revue de Philosophie; R. d. Fil.* = *Rivista di Filosofia; V. f. w. Ph.* = *Vierteljahrsschrift für wissenschaftliche Philosophie; Z. f. Ph. u. ph. Kr.* = *Zeitschrift für Philosophie und philosophische Kritik; Z. f. Psych.* = *Zeitschrift für Psychologie und Physiologie der Sinnesorgane, I. Abtl.: Zeitschrift für Psychologie.* —Other titles are self-explanatory.]

*La théorie relationniste de l'espace.* A. N. WHITEHEAD. Rev. de. Mét., XXIII, 3, 423-454.

Four distinct meanings are attached to the word 'space.' We have first the *immediately apparent space* of perceived objects, which differs with different subjects. If we accept the relationist theory of space, then apparent space is only a complex of certain relations between apparent objects. The space perceived by A, being the relation between the objects he perceives, differs from the space perceived by B, which is the relation between the objects he perceives. We must distinguish from immediately apparent space, *complete apparent space*, which is the total space of a complete world of apparent objects no longer referred exclusively to a perceiving subject. This means that the immediately apparent spaces are combined into a unique world; and that the immediately apparent spaces are completed by the spaces which could appear to hypothetical subjects. The third type of space is *physical space*, the space of a hypothetical world, the same for all, of which the objects exactly correspond to our sensations. This world is a hypothetical logical construction. The objects in our apparent space are directly correlated, not with the objects of the physical world, but physical events; hence all analysis replaces the fluid, changing, apparent objects by permanent and stable objects, molecules, atoms, and electrons. The fourth use of 'space' refers to *abstract geometrical space*. Geometry, as mathematics, is abstract and general. In physical space there are conceived to be molecules and electrons, which act on each other, either directly or indirectly. In order to see the value of a minute analysis of our ideas of spatial relations, we must consider three axioms, which govern thought on the interaction of physical objects. (I) One object cannot be entirely at two places at the same time. (II) Two objects cannot be at the same place at the same time. (III) Two objects cannot act upon each other at a distance. It follows that interaction of objects is inconceivable, for, according to the last two axioms, objects can never be at the same point at the same time, and can never interact at different points. Two volumes cannot interact, for their non-contiguous parts cannot interact by the third axiom, while the matter of the points on the limit has already been shown to be incapable of interaction. Interaction could only be conceived between finite atomic elements, some with surfaces, some without surfaces. This hypothesis is not logically impossible, but is very improbable. The real objection is not to be raised against the improbable consequences of the three axioms, but against the unanalyzed and uncritical conceptions of space and of objects from which they proceed. Geometry is accustomed to take its starting point from certain simple spatial entities, such as the point, the line, and the surface. It takes them as primitive simple ideas, variables which are not the functions of other variables. But if the relationist theory of space is adopted this would not be the first step of geometrical research. For such a theory it is essential that points, for example, are complex entities, the logical functions of these relations between objects which constitute space. For if a point is a simple thing, incapable of being logically defined in terms of relations between things, then there are absolute positions. This theory is almost universally abandoned, at least, nominally. Hence geometricians must seek to define points as functions of relations between objects. According to the relationist theory, objects do not first occupy space and then act upon each other; they first interact, and space is only the expression of certain properties of their interaction. The fundamental idea, then, of the relationist theory is a certain class of relations, $\sigma$. Let us investigate the possible definitions for some of the fundamental spatial concepts and discover what the properties of $\sigma$ must be if the usual propositions affirmed of concepts so defined are to be true. The world founded upon such a class of relations is the $\sigma$-world. Let us try to find a way in which a geometrical point can be defined in terms of the $\sigma$-world. Our first step in such a definition must be the definition of a relation $E\sigma$ which is to be called $\sigma$-inclusion, which is analogous to the relation of whole and part. There are three whole and part relationships. First we have the relation between a class and a fraction of a class, *i. e.*, the logical relation of 'all and some.' Secondly, we have the whole of heterogeneous parts, in which the parts differ in nature from the whole, as sugar is part of a pudding. And lastly we have the spatial whole and part, which is not to be reduced to an example of the first species of whole and part relation. We have to ask if we can define the last form of relation in terms of the class $\sigma$. This $\sigma$-relation is called the relation of $\sigma$-inclusion, thus avoiding the question as to whether it can itself be called a relation of whole and part. When we have defined this relation we shall be able to define points. The author proceeds to work out this definition of $E\sigma$ in terms of the symbolism of the *Principia Mathematica*. The reflexive, transitive, asymetrical character of the spatial whole and part relation is taken into account, as well as the possible infinite divisibility of space. Proceeding in the same fashion the author works out the conception of 'geometrical serial classes' converging on points, lines, and surfaces.

W. CURTIS SWABEY.

*Le fait moral et le fait social.* E. RÉCÉJAC. Rev. Ph., 486, pp. 546-562.

In seeking to give 'moral facts' a scientific objectivity we have tended to limit them to a social reality. But in consciousness there appears an opposition between the moral fact and social fact which is irreducible. They are apparently two modes of existence, or two currents, which refuse to lose themselves one in the other. Each of us conceals under his social appearances some customs (*moeurs*), the inner meaning of which is not penetrated by amateur research, and it is this reality which is the subject matter of Ethics. Our public customs and social conventions are a congealed crust beneath which the moral life conceals itself, not that it is afraid of society, or that it is by nature egoistic, but that it demands a different kind of liberty than that of the street. Primitive man, without being a metaphysician, was capable of taking a speculative attitude towards things, that is, of considering them as outside of himself, and in so doing took a step towards the intellectual and moral life. The opinion that social life arose through the institution of language is false, if we mean by language our highly developed instrument of discursive thought. Human thought did not begin by being discursive, and, further, some social relations must have existed between primitive men, lacking concepts, who gave expression, however, to their tumultuous cogitations by means of symbols. The work of Freud and others on symbolism, promises to throw much light on this stage in the development of human consciousness. Psycho-analysis indicates that the symbol is not a rare and accessory form of thought but a primitive proceeding of psychic activity, and the significance of dream analysis is that it documents us on the most simple mechanism of our being, the dream being a return of thought to its most elementary form. Here we must search for the source of the moral consciousness. The symbol satisfies the need of representing the unrepresentable. It began as a synthetic unity of images by which man fixed his feeling of selfhood, and receives a subjective content when thought grasps and affirms itself over against mere sentiency. The passage from this individualistic period of symbolic thought to the period of socialization was rendered possible by the fact that in the development of intellectual life, certain representations tend to persist because they are capable of producing among a number of individuals the same conscious states. The universalizing of signs would effect a stabilizing of judgments and mark a great advance towards the acquisition of concepts. Social organization arises from the gregarious state through the activity of Reflection, and the fundamental difference between these is the difference between a relation based on physiological attraction, and a relation based on the sentiment of personality. This latter relation gradually assumes the name of Right (*Droit*) and by subsequent definition and refinement this term comes to stand for a narrower field than the original fact. Life has an organic basis, and there were material conditions for the change from gregariousness to social life. The struggle for existence became economic and two factors or institutions arose, Value and Property, both resting on the moral fact of Personality, without which there could be no sense of value, no need of property. The sentiments of Value, Personality, Right cannot be disassociated, because they do not appear successively, because their origin is indivisible. The moral fact comes before and not after the social fact; it was a part of the body and soul of our first ancestors, that which marked them for civilization.

W. E. BINGHAM.

*Le rêele, l'apparent, l'absolu.* B. BOURDON, Rev. Ph., No. 490, pp. 316–340.

The real properties of objects do not differ specifically, that is in kind, from their apparent properties. Among the various forms, sizes, and colors of objects which present themselves to our sense organs under different conditions, we select some as peculiarly significant and call them real as opposed to merely apparent. Those which appear under the normal, ordinary conditions of perception we call real; those which appear under abnormal conditions we call apparent. If we view a circle with one eye or from an angle, we say that it appears elliptical, when really it is round. The real color of an object is that which appears to an observer with normal eyes in clear daylight. In this way, we might determine conditions of perceiving the real size of an object, the real direction of a line, the real velocity of a movement, etc. This distinction is not primitive, but is in a way arbitrarily adopted for practical purposes. The child gradually learns which of the multitude of appearances that come to him to call real. Real existences as well as real properties are determined in the same way. It may be asked then whether tactual space or visual space is real. Clearly visual space is more normally perceived, more reliable. One may also object that we know real size only when we measure, but measuring is nothing more than determining how many times one perceived length is contained in another. It must be remembered also that in the case of familiar objects we perceive their reality even under abnormal conditions. This is because the normal is the more ordinary and habitual and any extraordinary or abnormal factor is allowed for by means of the mechanism of association. In a like manner, we may speak of remembered reality and inferred reality. The former is real, if the original perception from which it is derived was obtained under normal conditions. The latter depends partly on remembered reality and is connected with the feeling of reality we have when in the presence of normal, ordinary experiences which are new to us. To go one step farther, the absolute itself does not differ in kind from the real or from the apparent. Any other view neglects the fact that what we call an object depends on a number of conditions. To pass from the notion that an object when not perceived by one observer may be perceived by another to the supposition that the object would exist if there were no observers at all, is to neglect the truth that subject and object are correlative terms and that the one can have no meaning without the other. Further, the word 'existence' is purely human and would have no meaning if there were no human beings. To conclude, let us apply these principles to two philosophical questions. (1) Is it true that we know only appearances? If the real is what is perceived under normal conditions, the idea that we know only appearances reduces to the statement that we know only what we know. (2) Is it true that color, sound, etc., do not exist in the external world? To consider sound as internal is to abolish the real significance of the terms internal and external, for on the same grounds that sound is put in the mind, externality itself can be made internal. Accordingly we must maintain that sound really exists outside our minds.

F. W. A. MILLER.

*The New Physiology.* J. S. HALDANE. Science, XLIV, 1140, pp. 619–631.

The last great turning point in the development of physiology, which occurred about the middle of the nineteenth century, was a change from the vital force theory to the chemical and physical viewpoint. We have now arrived at a new turning point. We realize that the environmental conditions of physiology are much more complex than they were thought by nineteenth century scientists, and that physiological causal chains are infinitely tangled. The New Physiology does not try to explain phenomena causally, but seeks merely to track out the normal details of life processes. All bodily functions tend to maintain a normal. Thus, the blood contains practically the same amounts of sugar, sodium chloride, and water, although these substances may be present in the body in large or in small quantities. We can understand bodily processes, not through causal explanations, but by recognizing the maintenance of these normals. We must assume the presence of life while investigating any of its phenomena. Physiology is something more than just a department of physics and chemistry. It may be said that these normals must be due to reactions between the organic structure and its physical and chemical environment. But the peculiar activities of the body depend upon the nature of its cells, which are made up of protoplasm. Protoplasm is extraordinarily sensitive to the minutest changes in its environment. Consequently the composition of the blood is almost incredibly constant. But the constancy of the blood is maintained by the combined reactions of the organs and tissues themselves. Thus the structure of the cells depends upon the composition of the blood, and the composition of the blood depends upon the structure of the cells. If this condition is simply a physical and chemical state of dynamic balance, it must be both complicated and unstable; and if it is once broken, bodily processes will go from bad to worse. But a living organism tends to adapt itself to injury and to repair loss. The balance is active, elastic, and stable. Normals are no mere accidents of physical structure, but are expressions of the organism. The physical and chemical viewpoint has failed, not because of inadequate knowledge, but because our present knowledge contradicts the mechanistic theory.

MELVIN RIGG.

*Contingence et rationalisme.* LIONEL DAURIAC. Rev. Ph., LXXXII, 8, pp. 105–134.

Since the time of Victor Cousin and Bouillier there have been many works embued with the rationalistic spirit. One of these is a brilliant thesis "*Contingence des Lois de La Nature*" by Boutroux. Dauriac raises the question whether rationalism and contingency, which have always been considered opposites, are therefore mutually exclusive. Aristotle has shown us that no notion is clear and distinct in the absence of its opposite. The necessary is thus defined in the function of the contingent. In studying the history of the two concepts, Dauriac suggests that we may distinguish three periods; (1) a moment of thesis in which the idea of the necessary makes its appearance, (2) a moment of antithesis between contingency and necessity, (3) a moment of synthesis. In the first period one might consider that mankind spent its time in fearing, desiring, and believing, a period anterior to reflection. Thus arose, during this time, a fatalistic belief from the fear of destiny. At the coming of the philosophical spirit this gradually decreases. In the fragments of Heraclitus one may see the idea of fatality at the very moment of its changing, an affirmation of the order of the world with allusions to the irrevocable decisions of Destiny. Since Heraclitus there has been a period of antithesis. If the first success of necessity was due to Heraclitus the final victory falls to Descartes and the Cartesians. But the human spirit cannot rest there; able to deduce man wishes to be assured that the facts conform to his deductions. The progress of experimental science thus brings up again the notion of contingency. And the question arises whether contingency is capable of entering into a coöperative alliance with necessity. Necessity is an expression of the order of the world, but it seems that it is not the only expression of it. Mechanism as the sole principle governing the universe would make this order precarious. Is it not possible then, Dauriac asks, to introduce into the cosmic order elements of contingent origin and essence? Boutroux does not question the truth of the laws of nature any more than Kant does. It is not the absolute contingency of reality which is discussed, but the contingency of the laws of nature. The problem is whether philosophy can explain the government of the world leaving only a contingent origin to these laws. From one group of laws to another there must, in this case, be a true advance, real novelty. The world is a hierarchy, contingent in its essence and in that of the species and individuals which it brings forth, contingent in the acts by which these individuals express themselves. The precaution taken by Kant to assure the safety of liberty by a kind of exile is thus a useless one. But empiricism is not the substitute for Kantian intellectualism, since empiricism excludes necessity. The empiricism of Boutroux is only a 'methodical empiricism'; he has kept the essentials of Kant's system, the moral law and the postulates. O. Hamelin has spoken of the moral law as not 'necessitating' but 'necessary.' In other words the moral law would be not less necessary if never obeyed. Viewed in this light necessity, far from excluding contingency, is supported by it. The doctrine of Boutroux is thus an anti-intellectualistic Kantism. Like his master, Lachelier, Boutroux did not separate the interests of Criticism from those of Morality and Religion. Science, art, religion, aesthetics are all points of view of the intellect on reality. To the old metaphysics is left now only a moral magistracy. "Kant believed that he saved liberty in exiling it from the world; Boutroux has saved human reason in freeing it from all contact with a nature made to serve it for a step-ladder and not for a seat." Dauriac, in order to show that the so-called crisis of contingency is perhaps really a necessary moment in contemporaneous rationalism, demonstrates how this doctrine of Boutroux could have arisen in another way, coming from Renouvier, Augustin Cournot and Auguste Comte. Comte is the true Kant of French philosophy; his lectures on Biology may be compared to pages of Kant on the dialectic of teleological judgment. He does not mention contingency, but the notion nevertheless permeates his pages. Boutroux on the whole knew Renouvier better than Comte however, though he does not like Renouvier declare against the noumenon. The question must now be answered, says Dauriac, whether contingency is compatible with order. Plato speaks as if necessity were susceptible finally to a difference of degree. Is not this equal to a difference of quality in such a concept as necessity? Philosophy then brings a new type of necessity which acts no longer *a tergo* but *a fronte* in imitation of finality. Mechanism can no longer do without a complement in lack of which all true *raison d'être* is also lacking to it. In Boutroux this viewpoint reaches its highest expression: "Resolutely hostile to blind and brutal necessity contingency itself advances before a regime of constancy through which it is indeed difficult not to perceive reason at work." Sooner or later then, Dauriac concludes, it will be inevitable that the seal of intelligence will efface every trace of contingency.

VIRGINIA BAKER.

*La théorie cartésienne de l'énumération.* R. HUBERT. Rev. de. Mét., XXIII, 3, 489-516.

The fourth rule of the Cartesian method, that of enumeration, is obscure, and yet it is essential to an understanding of the first three rules, with which it forms an indivisible unity. The first three rules are those of evidence, of division, and of progressive order. These are made clear in the *Discourse.* The theory of enumeration is expounded in the *Regulæ*, which Descartes left incomplete. Descartes was hostile to pure empiricism and scorned history and geography as not founded upon reason; the generalizations to be founded upon casual observations were superficial. Is, then, experience excluded from his method? No, but the problem is to determine the nature, conditions, species, and rôle of experience. What method permits us to interpret experience, without omitting any part, and grasping its ultimate elements? Descartes had little use for the scholastic logic of extension, of genus and essential difference. His objection was that there are points where immediate experience suffices for itself and is fundamental to science; the scholastic method obscured this experience. Intuition is the primary form of evidence. It is not sensible perception, but intellectual apprehension. Intuition reveals to us the simple elements which enter into the composition of things. It also reveals their essential connections. Intuition is limited to some single particular relation, and is condemned to immobility. From these particular relations, analysis can only bring out what is contained in them. There is also necessary, then, a continued movement of thought, a synthesis. The character of this Descartes failed to make clear. It had for him, however, two characteristics: It was not instantaneous, but successive, and it possessed a derivative evidence, both in contrast to intuition. All reasoning to distant consequences requires a multitude of disconnected judgments as premises. Deduction is unable to connect the diverse intuitions, since it depends upon memory for the continuity of its process. The problem of enumeration is to enable science to grasp the real in its totality, and to give a certitude equal to that of intuition to deduction. Enumeration must be the process which completes intuition and gives us absolute certitude. To know is to discover the simple natures which enter into the composition of things, to establish relations between them, and to arrange them in a serial order, such that one ends by logically reconstructing the concrete reality. Composite natures, which are not composed by the intelligence, can only be known by experience. This function of experience does not contradict Descartes' affirmation that experience is only to be believed when it bears on simple natures, for objects so known are but problems of which the solution is unknown. Among the multiplicity of consequences which might be drawn from principles, experience indicates some which are worthy of attention, as part of the order of natural things. If all science consists of connections between simple natures, then all science must be conceived as a universal mathematics. In the *Regulæ* the principle, of the *Discourse*, of division of difficulties is combined with the principle of enumeration; that is, it is not sufficient to search the simple natures which enter into the composition of a complex question; one must know that he has them all. What, then, is enumeration? One interpretation is that it is a means of verification, a logical process permitting the elimination of memory with its incertitude. That is, it permits that a series of relations be run through so rapidly that the whole is grasped in a single intuition. But there are texts which oppose this interpretation, presenting enumeration as a process of classification, others which regard it as necessary to putting problems in equational form, and still others which regard it as essential to the establishment of logical order. A second interpretation of enumeration is that it is a process, not of verification, but of research, supplementing intuition. It is, thus, an inductive inference, or an analogical inference; an operation which draws a conclusion from a collection of separate things. There is some truth in this view, but we must not forget the controlling and verifying function elsewhere ascribed to enumeration. Enumeration is, in fact, an essential complement of the method for determining problems. It insures that we have taken all the elements into account. It is the complete investigation of all objects presented to thought. Intuition lets us perceive the simple elements of an object; deduction reconstructs the object; enumeration alone makes us sure that the re-composed object corresponds adequately with reality. It is thus the condition of the harmony of thought and things. It further shows what problems are soluble and what insoluble. It is essential to classification, not extensive classification of genus and species, but comprehensive classification. It arranges things according to essence, *i. e.*, according to the simple natures of things. Enumeration is really perfect induction, interpreted in comprehension. It is not complete in the sense of being founded on all possible cases, but perfect in the sense of attaining all the absolutely necessary elements of an object. Enumeration is the complement of intuition, for in enumerating all the circumstances of a definite question, it alone renders possible the perfect equation of thought with reality. It is such because nature is such that things are reducible to simple elements in necessary relations; because everything is reducible to order and measure. Enumeration expresses the preoccupation with the real and concrete of the Cartesian method.

W. CURTIS SWABEY.

*The Philosophy of Vladimir Soloviev.* PROF. L. M. LOPATIN. (Translated by Alex. Bakshy.) Mind, New Series, No. 100, pp. 425–460.

Vladimir Soloviev was born in 1853 and died in 1900. His theories, as expressed in *The Critique of Abstract Principles* and other works, were the first original expressions of philosophic thought produced in Russia. Influenced by the spirit of his time, he looked for an early triumph of good in the world,—during his youth and while in the clutches of materialism through a social revolution, and in later life, after his idealistic nature had asserted itself, through a theocratic organization of mankind. After an exhaustive study of the history of philosophy he attempted to reconcile the systems of Schopenhauer and Hegel. Misunderstood by his own people and unable to believe that philosophy must follow in the wake of science, Soloviev originated a theory in opposition to all the western schools. Seeing a weakness in the system of Kant and his successors and convinced that a new method was necessary, he took up his position as a mystic in spite of the antagonistic attitude of the time. Supplementary to his faith in the final triumph of truth Soloviev had a strong belief in the spiritual nature of the world which at the same time explains the vitality and concrete character of the system and is responsible for its chief defect, namely, the assignment of equal value to all the links in his dialectically constructed system. The system hinges around the ideas of spirituality of all being, absolute all being, and God-mankind. The imperfection of the world is caused by the opposition between the world of space and time and the real world of which God is the source, and it will be done away with upon the attainment of the highest good through the perfection of man. Since absolute unity would deprive matter of all its material properties and philosophic realism attempts to eliminate all subjective qualities from reality, the only logical materialism is atomic in nature. The only thinkable reality which would give these atoms the property of impenetrability and extension is impulse and resultant resistance. But impulse is known only from the inner experience of our spirits and the real is, therefore, immaterial and monadic in its nature. Because of the impossibility of experiencing the real, whether atomic or monadic, only phenomena can be truly known, and since only my sensations exist for me, things are only possibilities of my sensation and "what actually exist are only the phenomena of consciousness and not of my consciousness, since I, as I, do not exist, but of consciousness in general, independently of a conscious being or a real subject of cognition." Rationalism, on the other hand, if consistent, results in Hegel's doctrine of the idea as the only reality, which is inconceivable, and therefore illogical, in that it passes from the abstract to the real and contradictory in supposing an idea preceding both cognitive subject and that which is cognized. The absolute principle of things, or God, is a living unity of the diverse manifestations in whom is contained as an *all* a potentiality of the manifestation of his creative genius. This *all* "is the world inasmuch as it is contained in God, inasmuch as it eternally faces God as the ideal image of his creation, since in God and for God all is eternal." Soloviev relates the world to God as a universe in himself which is distinct from himself and yet greater than an idea because an indissoluble element of his being, and by this relation the world is revealed as good, truth, and beauty. Through the exercise of its freedom the world soul fell off from God, retaining only a suppressed longing for its former fullness of being and has become the mutilated image of the ideal world which the present material world now presents. The unity of the eternal world is expressed in terms of space filled with atoms, its ever present eternity in terms of time, and its self definition in terms of mechanical causality. Three phases in the permeation of the elemental chaos by the unifying power of God are shown in mechanical, dynamic, and organic unity. The process culminates in man, from which point the purification of all evil is to proceed till a complete unity such as that exemplified in Christ, is reached. From these general views Soloviev deduced his moral ideals "Have God in thyself" and "Treat everything in the manner of God" as well as his social ideals of freedom, equality, and brotherhood. In view of the fact that Soloviev still has many followers, that he took up this point of view after studying the modern theories, and that he pointed out the only escape from the depressing contradictions of philosophic movements of his time, it can hardly be maintained that his position has been entirely condemned by history. In the face of world opposition he "called all and sundry to the *true* light."

CHARLES H. WRIGHT.

*La Conscience tactile-motrice pure.* TH. RIBOT. Rev. Phil., XLI, 7, pp. 26–43.

Alongside the psychology of intellectual states and that of affective states, there is rapidly growing up and making a place for itself, particularly in America, a 'motor theory.' Physiologically, it affirms the dominance of the motor center in cerebral activity; psychologically, it regards movement as the unifying, co-ordinating, regulating element in experience. The theory has been ably criticized by Pillsbury, with whose conclusion the author of this article agrees, that a great but not an exclusive importance is to be attached to movement. The present article is devoted to a study of consciousness in the remarkable case of persons both blind and deaf, and usually without the sense of smell also, from early infancy. Such persons know the world only through tactile and kinaesthetic sensations. With the general organization, physical and nervous, of the highest of animals, their senses are on the plane of the lowest, the plane of undifferentiated touch. The richness of their psychic life is found to be remarkable; they not only orient themselves intelligently in a complicated environment, but also form complex associations, generalize, and think abstractly. They interpret character and sense the meanings of things through tactile imagery, and their affective life seems to be practically normal. In the case of Helen Keller we meet with a fertile imagination and great powers of literary invention. Particularly striking is the free and effective use of visual and auditory imagery in composition, though we find a certain failure to distinguish between what is imagined and what is remembered. Such persons commonly succeed in giving some meaning to the language forms relating to sights and sounds, and often imagine that these meanings are of the same nature as those which the words have for normal individuals. The great problem in this branch of abnormal psychology relates to the way in which one sense can substitute for and replace another. Totally blind and deaf persons can distinguish large numbers of associates by their characteristic body odors or by the feeling of their footfalls, can feel the vibrations of loud sounds and even to some extent distinguish pitch, and commonly know in some way when they are approaching an obstacle such as a wall or a tree in their path. The secret of the power is to be found in the primary characteristic of living beings, the power of *adaptation* or learning. Biologically, it is best understood in the light of Lamarckian rather than Darwinian principles, attention acting as an agency for fixation. Careful tests of the tactile sensitiveness of the fingers of the blind have shown them not above the average, and the reading finger is less rather than more sensitive than the others. The superiority of adaptation is evidently in the kinaesthetic sense, a sufficient indication of the importance of movement in the psychic life.

F. H. KNIGHT.

*La Logique des classes et la théorie des ensembles.* H. DUMFUMIER. Rev. de Mét., XXVI, 4, pp. 607–611.

Attempts to reach the fundamental concepts of mathematics have produced symbolic logic, and the algebra of logic, a renaissance of logical study, and a realization of the intimate connection between logic and mathematics. In this connection it is worth while to consider the relation of the mathematical theory of ensembles to the logical calculus of the classes, which has as its fundamental principle the idea of subsumption; and includes multiplication, addition, and negation in its processes. Even when the algebra of logic is taken as quite distinct in its operations from that of space and number we still fail to explain satisfactorily the relation of the individual to the class, and the artificiality of the reduction of logic to a quantitative relation becomes evident. Such interpretations do not emphasize sufficiently the rôle of negation, the possibility of being either affirmed or denied seemingly being disregarded as fundamental in logic. In the notion of ensemble mathematics is considered as the point of departure, and yet the concepts of logic seem to terminate in the effort of mathematics towards a more general exposition of its fundamental ideas. The '*Calcul des Classes*' appears as a generalization of the theory of ensemble.

E. D. PUGSLEY.

*Logical Work of Leibniz.* PHILIP E. B. JOURDAIN. Monist, XXVI, 4, pp. 504–523.

Leibniz's notions of infinitesimal calculus and monadology indicate that his philosophy and his mathematics were founded in his logic. When but eighteen years of age he concluded that "all ideas can be reduced by decomposition to a small number of primitive and indefinable ideas." From these, completely enumerated, an alphabet of ideas could be made; and then by combination any complex idea could be formed. Further, he maintained that the principle application of this art of combination is in logic, especially in the logic of discovery, since the fundamental problem of the logic of discovery reduces to a problem of combinations. Then, on analyzing all concepts by definition, that is, by reducing to a number of simpler concepts, we ultimately arrive at the fundamental and indefinable concepts. These primary concepts Leibniz represents by some character, which he doubles for the second order, and so on. He would then represent a compound term by the product of the terms contained. This was his idea of a "rational script," which he conceived to be a powerful agent of reason, and valuable in promoting commerce. This "rational language," which at the same time would be a calculus or algebra of thought, was, however, more difficult to construct than he had first believed. In order to accomplish this he set about studying the living languages in order to extract the common simple ideas. He hoped to discover the "Characteristic" whose conditions he formulated to be a basis of an algebra of logic; a "*calculus ratiocinator.*" When this was put in use he expected reasoning would become machine-like, the mind being relieved of all except the solution of the problem according to algebraic-like rules.

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*Sensation and Perception.* GRACE DE LAGUNA. J. of Ph., Psy., and Sci. Meth., I, Vol. XIII, 20, pp. 533–547; II, Vol. XIII, 23, pp. 617–630.

I. *The Genetic Relation.*—The author criticizes the doctrine of the genetic primacy of sensation. The general facts of evolutionary development support the view that the beginnings of conscious life possess a minimum of diversification and specialization. Psychology has held the view, up to the last quarter of a century, that analytic simplicity and genetic primacy were one and the same thing. Such a view is based on the assumption that the infant is capable of experiencing the qualitatively distinct sensations of the adult.

This assumption, the author shows, is rather questionable. In the first place the brain is now regarded by modern psychologists as the organ of bodily integration. "The chemical discharge of cells in the cortex is no longer regarded as the correlate of conscious processes;" instead we must regard certain modes of functioning of the nervous system as conscious. As the infant clearly has not the functionally differentiated sensory centers of the adult one cannot suppose him to have the distinct sensations of the adult. In the second place there is the evidence of the child's behavior. Here it is apparent through observation of the responses evoked by the stimulation of the special sense organs that the child is incapable of discriminating sense-qualities. His responses may be termed type reactions, the earliest being movements of the organ or part stimulated to facilitate or prevent further stimulation. The only discrimination shown at first seems to be between what is and is not pleasant. Preferential discrimination as in Mrs. Wooley's color tests is not sufficient evidence that a qualitative difference is perceived between two stimuli: A baby's world is one of imperative urgencies; "what is and what it demands are telescoped together." It is only the adult, for whom the sensuous world has lost its urgencies, who can gain the concept of "pure sentience."

II. *The Analytic Relation.*—The author discusses the analytic relation of sensation and perception and the conditions under which sensations are experienced. In the first place it is "theoretically unfruitful to regard the sensation as an element of the percept conceived as an existential complex." When we treat the percept as a complex of sensations, its most salient feature, the fact that it is meaningful, is quite unaccountable, for sensations have no known properties or modes of behavior which would help us to understand the complexes into which they enter. In the second place there is no possible empirical evidence to support such a doctrine. The doctrine of specific energy which forms the basis for this theory may be criticized on the ground that the experiencing of specific sense qualities depends as much on the condition of attention as on the stimulation of the proper end organs and sensory cells. Not every stimulation of a given set of sensory cells yields the sense qualities they are capable of mediating. The problem is then under what conditions these sense qualities are experienced. When we look to the mode of functioning of the sensory cells of the cortex it is seen that each of the groups comes to be a unit in a multitude of functional systems,—a unit in a different multitude from every other. The author then offers as a supplement to the doctrine of specific energy the hypothesis that "the functional indeterminateness or independence of the sensory cells of the cortex is the essential condition of their mediating the experience of sensation qualities." The condition under which the distinctive sense qualities are experienced is the disintegration of the functional group and the independent functioning of the cells in question. In accordance with this hypothesis the psychological doctrine that the sensation is an element of the perception must be given up. We may also reach through it a more fruitful conception of the nature of psychological analysis and the problem of meaning.

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